HACETTEPE UNIVERSITY INSTITUTE OF POPULATION STUDIES (HUIPS)

DEM 601 Introduction to Demographic Analysis

Lecture 6 handout

TOPIC
Standardization of Death Rates & Concepts in Early Life Mortality

SESSION
5 November 2026

NAME

The shape of the lecture, not a substitute for it. Every heading is a slide, in the order it is shown, with the formulas it carries and the terms it defines.

Opening

WHERE WE ARE The comparison we could not make

Comparing the Incomparable

THE PROBLEM Where we left the country

Sketch the shape, and label the axes

THE IDENTITY A summary rate is rates times weights

$$\text{CDR} = \sum_x {}_nm_x \cdot {}_nc_x$$

$${}_nm_x = \frac{{}_nD_x}{{}_nP_x} \qquad {}_nc_x = \frac{{}_nP_x}{P}, \quad \sum_x {}_nc_x = 1$$

The rates, m the intensity

The weights, c the composition

THE FORK Two things in the product, two ways to fix it

Direct standardization hold the weights fixed

Indirect standardization hold the rates fixed

YOUR TURN Same rates, different answer

THE ANSWER Same rates, different weights

Direct Standardization

THE METHOD Somebody else's people, your own rates

$$\text{ASDR}^j = \sum_x {}_nm_x^j \cdot {}_nc_x^s \qquad {}_nm_x^j \text{ is population } j\text{'s own rate}, \quad {}_nc_x^s \text{ the standard's share}$$

Choose a standard and name it any age structure will do, but the answer means nothing without it

Take each population's own rates age by age, unchanged

Multiply and sum each rate times the standard's share, then add

WORKED On Türkiye's age structure

THE RESULT The two provinces change places

Türkiye The standard itself

Indirect Standardization

THE PROBLEM A rate built on almost nothing

THE METHOD Your own people, somebody else's rates

$$\text{SMR} = \frac{D^j}{\sum_x {}_nm_x^s \cdot {}_nP_x^j} \times 100 \qquad \text{ISDR} = \frac{\text{SMR}}{100} \times \text{CDR}^s$$

Expected deaths the standard's rate at each age, times your own people at that age, summed

SMR observed deaths over expected, times one hundred

ISDR the SMR times the standard's crude rate, back in deaths per 1,000

WORKED On Türkiye's rates

THE RESULT 's SMR and ISDR

SMR Observed over expected, times 100

ISDR SMR times Türkiye's crude rate

SIDE BY SIDE Which method, and when

THE WARNING Two SMRs are not comparable

What an SMR compares one population against the standard

What it does not compare one population against another

YOUR TURN Two SMRs, one question

THE ANSWER Not supported, as it stands

Early-Life Mortality

THE PERIODS Conception to the fifth birthday

Sketch the shape, and label the axes

THE PERIODS Drawn to scale

Sketch the shape, and label the axes

THE DENOMINATOR **Not a population, a cohort of births**

$$\text{IMR} = \frac{\text{deaths under age 1 in year } t}{\text{live births in year } t} \times 1000$$

What it looks like a rate

What it behaves like a probability

THE FORMULAS **Every rate over live births**

$$\text{rate} = \frac{\text{deaths in the year, at the ages below}}{\text{live births in the same year}} \times 1000$$

THE LADDER **Where the first year is cut, and why**

Neonatal The first 28 days

Postneonatal The rest of the first year

Infant Neonatal plus postneonatal

Under five Infant plus ages 1 to 4

TÜRKIYE **The four rates, and the targets under them**

Sketch the shape, and label the axes

THE SHIFT **Which part a country removes first**

Infant, all of it

Postneonatal, the exogenous part Fell faster

Neonatal, the endogenous part Fell slower

THE WORLD **Where a baby is least likely to reach one**

Sketch the shape, and label the axes

TÜRKIYE **The same measure, inside one country**

Sketch the shape, and label the axes

THE FORMULAS **Two rates over all births**

$$\text{stillbirth rate} = \frac{\text{stillbirths, from 28 weeks of pregnancy}}{\text{live births} + \text{stillbirths}} \times 1000$$

$$\text{perinatal rate} = \frac{\text{stillbirths} + \text{deaths at 0 to 6 days}}{\text{live births} + \text{stillbirths}} \times 1000$$

THE BOUNDARY **Where a life is counted as beginning**

Live birth inside the infant mortality rate

Stillbirth outside the infant mortality rate

The grey edge one baby, two records

PERINATAL **The measure the boundary cannot move**

No minimum Every birth, however premature

From 28 weeks or 1,000 g Very premature babies left out

Only the threshold differs Same year, same office

MATERNAL **The other measure over births**

Coded in the register deaths coded to pregnancy and childbirth

Investigated The Ministry of Health's case review, same year

SDG target 3.1 For the world, by

CORRESPONDENCE **The rate that divides the wrong babies**

CLOSING **What you can do now**

Write a summary rate as rates times weights and say whether a gap comes from the rates or from the age structure

Standardize directly one structure for everybody, and declare the standard you used

Standardize indirectly compute an SMR, read it against 100, and refuse to rank two of them

Compute the early-life rates over live births, or over all births for stillbirth and perinatal, and say where the live-birth line is drawn